Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, D.C. 20554

Expanding Flexible Use of the 3.7 to 4.2 GHz Band	)	GN Docket No. 18-122
Expanding Flexible Use in Mid-Band Spectrum Between 3.7 and 24 GHz	)	GN Docket No. 17-183 (Inquiry Terminated as to 3.7-4.2 GHz)
Petition for Rulemaking to Amend and Modernize Parts 25 and 101 of the Commission's Rules to Authorize and Facilitate the Deployment of Licensed Point-to-Multipoint Fixed Wireless Broadband Service in the 3.7-4.2 GHz Band	)	RM-11791
Fixed Wireless Communications Coalition, Inc., Request for Modified Coordination Procedures In Band Shared Between the Fixed Service and the Fixed Satellite Service	)	RM-11778

COMMENTS OF MOTOROLA SOLUTIONS, INC.

Motorola Solutions, Inc. ("Motorola Solutions" or "MSI") hereby files these comments in response to the Notice of Proposed Rulemaking that is considering making 3.7-4.2 GHz band spectrum available for new wireless uses while accommodating the needs of incumbent Fixed Satellite Service ("FSS") and Fixed Service ("FS") licensees.[1] MSI believes that a significant portion of this 500 MHz band of spectrum will be able to support innovative, next-generation fixed and mobile broadband services for a wide variety of users and networks.

The 3.7-4.2 GHz band will benefit from the technology eco-system being developed in the adjacent 3.55–3.70 GHz band as a result of the Commission's actions in creating the Citizens

[1] *In the Matter of Expanding Flexible Use of the 3.7 to 42. GHz Band*, Order and Notice of Proposed Rulemaking, GN Docket No. 18-122, 83 Fed. Reg. 44128 (2018), ("NPRM" or "Order").

Broadband Radio Service (CBRS).[2] MSI believes that a similar framework for spectrum access in the 3.7-4.2 GHz band as the CBRS will generate the same realistic opportunities for organizations other than large commercial wireless carriers to develop private and secure broadband networks that are designed to meet customized needs over campus-sized environments. There are a variety of industrial and enterprise sectors such as oil & gas companies, utilities and other critical infrastructure entities, industrial and manufacturing, mining, hospitality, as well as educational institutions that would benefit from being able to design and deploy private broadband networks that focus on mission-critical applications in a walled environment that prevents adversaries from accessing sensitive data. A regulatory framework modelled after the CBRS will further promote a diverse user community that will foster the development of innovative solutions and help to spur economic growth through improved productivity and job creation.

To accomplish those goals, MSI supports a hybrid approach in deploying terrestrial services in the 3.7-4.2 GHz band, where a portion of the band (perhaps 100-200 MHz) is cleared of incumbents for exclusive, licensed wireless usage, with the remaining spectrum available on a shared basis in a manner similar to the CBRS band. MSI supports a voluntary, market-based approach to most quickly clear a portion of the band.[3] Due to the widespread use of the band, MSI does not believe it is possible to clear a majority of the band. Therefore, MSI believes a shared approach is appropriate to enable expeditious use of the majority of the band. The shared

---

[2] *See, e.g., Promoting Investment in the 3550-3700 MHz Band*, Notice of Proposed Rulemaking and Order, GN Docket No. 17-258, 32 FCC Rcd 8071.

[3] This includes the use of a Transition Coordinator, or similar centralized facilitator, and should also allow targeted clearing of relatively small geographic areas or bandwidths to improve spectrum efficiency. Motorola Solutions suggests allowing spectrum blocks as small as 20 MHz to be transitioned to flexible terrestrial services and does not support a mandated minimum transition target (*e.g.*, an initial minimum spectrum benchmark of 100 MHz).

portion is best suited for well-contained, localized uses, due to the large number of remaining (existing and re-packed) incumbents that will continue to need protection throughout the band. MSI envisions that numerous types of localized public and private broadband networks will be able to operate in this spectrum without negatively impacting incumbent services. Low power, small cell operations will be able to efficiently operate in many areas, and will facilitate enhanced broadband services for public spaces, schools, state and local governments, enterprise and industry.

MSI supports the Commission's proposed definition of incumbent earth stations requiring protection as those that: (1) were operational as of April 19, 2018; (2) are licensed or registered (or had a pending application for license or registration) in the Commission's IBFS database as of October 17, 2018; and (3) have timely certified the accuracy of information on file with the Commission to the extent required by the Order.[4] MSI agrees with the Commission's proposal to exclude from the definition of incumbents any earth stations that are not licensed or registered in IBFS, or that are licensed or registered in IBFS, but for which the licensee/registrant does not timely file the certification required in the Order.[5] Incumbents should be allowed to modify their stations at the registered location, but should not be permitted to add new locations, applications, or registrations. MSI also supports allowing periodic (*e.g.*, annual) updates to existing registration information. Finally, MSI agrees with the Commission's proposal of only protecting earth station operators' regular daily use and only for the operational frequencies, azimuths and elevation angles that are being utilized.[6]

---

4 Notice at ¶ 27.

5 *Id.* at ¶ 28.

6 *Id.* at ¶ 37.

With regard to public and private broadband network deployments in the shared portion of the band, MSI believes that well-contained networks (*e.g.*, indoors, or otherwise contained by terrain, clutter, *etc*.) will be able to utilize reasonable small cell transmit power levels of 1W EIRP/10 MHz or less[7] over localized areas, under SAS or automated frequency coordinator (AFC), and not cause harmful interference to incumbents. The low transmit power levels, when combined with accurate propagation modeling performed in an SAS or AFC (taking into account antenna patterns on both ends of the link, terrain effects and high resolution clutter models)[8] should allow operation within several kilometers of FSS sites.[9] Thus, much more efficient utilization of the shared mid-band spectrum could take place, and allow broadband services in public spaces, schools, government, enterprise and industrial facilities, especially when combined with the need to protecting only existing incumbent operational frequencies, as previously mentioned. This approach also facilitates deployments of capacity enhancing small cell technologies (*e.g.*, cellular off-loading), which has been proven to be a valuable technology in the unlicensed bands.[10] Higher power levels could be utilized in areas more distant from

---

[7] This would be consistent with the power limits afforded to CBRS devices. *See* 47 C.F.R. § 96.41 (b).

[8] High resolution (*e.g.*, of 5-30m feature) clutter modeling includes the effects of buildings, foliage, and other RF absorbing materials. Popular terrain-based modeling such as the ITU Irregular Terrain Model (ITM) only model ground-level terrain effects, and not localized clutter (and thus significantly under-estimate propagation losses on average).

[9] For example, a 30 dBm indoor transmitter, with 15 dB of building wall propagation losses, and 130 dB of path losses (including clutter) over a 5 km path to an FSS site, and 10 dB of combined transmitter and receiver antenna pattern losses (on an absolute basis) would present no more than a -125 dBm signal at the victim receiver input (*i.e.*, FSS receiver antenna output). Previously quoted (in footnote 96 of the NPRM) FSS signal levels are approximately 83 dBm at the antenna output when taking into account FSS antenna gain, resulting in a high signal to interference plus noise ratio. The SAS is capable of accurately modeling these interference paths based on actual deployments.

[10] The unlicensed Wi-Fi bands, including LAA services, carry a majority of day-to-day consumer data traffic.

incumbent operations (again under SAS or AFC control). As incumbent usage in the band is much less dynamic than in the CBRS band, the SAS or AFC functionality only needs to be updated or queried on a daily (or even weekly) basis.

MSI supports the use of 10 or 20 MHz unpaired blocks of spectrum, with aggregation up to 100 MHz. MSI notes that smaller blocks of spectrum may be easier to free up for flexible terrestrial uses. Market based mechanisms should be allowed to determine the block and service area sizes of spectrum. License sizes should be no larger than county sized areas, with consideration for even smaller sized areas (e.g., census tracts). As in the CBRS band, partitioning and disaggregation of licenses should be allowed. The Commission should also make clear that use of the spectrum would be permitted in the Gulf of Mexico on both an exclusive use, licensed basis as well as a shared access basis.[11] MSI supports open eligibility for licensing of the band to promote innovation and investment by the widest range of interests.

MSI cautions against utilizing very high transmit power levels in the licensed portion of the band (*e.g.*, 1640 W/MHz), as this can result in blocking issues in adjacent bands, including the CBRS band, especially if the power-on-ground levels are significant around the base stations. MSI recommends the use of reasonable power flux density limits (*e.g.*, 3000uW/m^2 for 100MHz channel bandwidth, with reductions for smaller bandwidths).[12]

---

[11] The Gulf of Mexico is not identified as a county and, therefore, would not be included in the list of geographic service area for exclusive licensed use of the 3.7-4.2 GHz band. While users in the Gulf would likely take great advantage of shared access, MSI recommends that the Commission also propose a licensed area covering the Gulf consistent with existing allocations. *See* 47 C.F.R. § 27.6.

[12] *See* 47 C.F.R. § 90.542.

MSI looks forward to the many opportunities that an additional 500 MHz of spectrum provides for innovative broadband systems and encourages the Commission to employ an inclusive approach that involves all interests and stakeholders in the band. Motorola Solutions urges the Commission to move expeditiously in this proceeding to make additional spectrum available for a wide variety of advanced broadband applications.

Respectfully Submitted,

/s/ Frank Korinek
Frank Korinek
Director of Government Affairs
Spectrum and Regulatory Policy
Motorola Solutions, Inc.
1455 Pennsylvania Avenue, N.W.
Washington, DC 20004
(202) 371-6900

October 29, 2018